QORE, Inc.
281 Fairforest Way
Greenville, South Carolina 29607

Job No. 5519, Report No. 73701

July 15, 1999

REPORT OF PRELIMINARY GEOTECHNICAL EXPLORATION

Hunter Industrial Park - Phase II
Industrial Drive
Laurens, South Carolina

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PROPERTY SCIENCES

July 15, 1999

Laurens Commission of Public Works
c/o Wiedeman and Singleton, Inc.
1789 Peachtree Road
Atlanta, Georgia 30309

Attention: Mr. Gary D. Trott, P.E.
Vice President

Re: Report of Preliminary Geotechnical Exploration
Hunter Industrial Park - Phase II
Laurens, South Carolina
QORE Job No. 5519
Report No. 73701

Dear Mr. Trott:

QORE, Inc. has completed a preliminary geotechnical exploration for the referenced project, and we are submitting our findings in this report. The work was performed in general accordance with our Proposal for Preliminary Geotechnical Exploration (QORE Proposal No. GP-4055-99R dated May 21, 1999), as you authorized on June 17, 1999. The purposes of the preliminary subsurface exploration were to characterize subsurface conditions at the site, provide general site preparation recommendations (including potential excavation difficulty due to rock and/or groundwater), and provide preliminary geotechnical engineering recommendations. This report presents a brief discussion of our understanding of the project, the exploration procedures and results, and our conclusions and recommendations regarding the above considerations.

QORE Property Sciences 281 Fairforest Way Greenville, South Carolina 29607 (864) 297-9944 fax (864) 297-0462

PROJECT INFORMATION

QORE Property Sciences has been provided a "Grading Plan" prepared by Wiedeman and Singleton, Inc. (dated May 1999). This plan illustrates the site boundaries, topographic information (existing and proposed grades), and some existing site features. The proposed locations and finished grades of two light industrial buildings are also indicated on this plan.

Information concerning the future development of the project site was furnished through conversations with Mr. Trott. Based on our discussions and review of the provided plan, we understand the project will consist of the second phase development of the Hunter Industrial Park. The Phase II tract consists of approximately 63 acres, divided into 6 parcels ranging in size from 8.7 acres to 11.4 acres. We understand that light industrial buildings will be initially constructed on the two parcels located adjacent to Industrial Drive. The first building will have an approximate plan area of 50,000 square feet at a proposed elevation of 690.25 feet, and the second building will have an approximate plan area of 100,000 square feet at a proposed elevation of 680.5 feet. A paved entrance road which divides these parcels will also be constructed at this time.

No other information regarding the design of these structures is available at this time; however, we assume they will be single story, metal framed structures with concrete slabs-on-grade. Based on our experience with light industrial buildings, we anticipate typical maximum column and wall loads will be on the order of 100 kips and 3 kips per linear foot, respectively. In addition, we assume typical maximum floor slab loads on the order of 250 pounds per square foot with no extraordinary slab performance criteria.

Currently, most of the site is heavily wooded. Initial site grading will consist of leveling the two proposed building pads and the entrance roadway. Based on our observations during the site reconnaissance, we anticipate site grading will include maximum cuts (excavations) of up to 10 feet and maximum fills of up to 25 feet in the vicinity of low lying drainage features. Future development at the site will include grading the four remaining parcels and completing the entrance roadway.

FIELD EXPLORATION & TESTING PROCEDURES

The preliminary geotechnical exploration began with a visual site reconnaissance by a member of our professional staff. Ten soil test borings (B-1 through B-10) were located in the field by surveyors with Wiedeman and Singleton, Inc. Three borings were located in each of the proposed building pad areas (B-1 through B-3, and B-4 through B-6), two borings were located in the proposed roadway (B-7 and B-8), and two borings were located in future development parcels (B-9 and B-10). Because most of the property is heavily wooded, paths were cleared through the wooded areas with a front end loader to provide access to the boring locations. A Boring Location Plan (Plate 1) is included in the Appendix of this report to illustrate the approximate boring locations. Ground surface elevations at each boring location were measured by the surveyors and are referenced on the Soil Test Boring Records in the Appendix.

The soil test borings were performed with a CME 550 drill rig mounted on an all-terrain vehicle. The borings were advanced by mechanically rotating hollow stem augers into the ground. Standard Penetration Tests (SPT) were performed with an automatic hammer at regular intervals in the borings to estimate soil consistencies and obtain soil samples. The borings were drilled to depths of 20 to 30 feet below the ground surface, or auger refusal, whichever was encountered first. In addition to the soil testing and sampling, the depth to groundwater was measured in the borings at the time of drilling and after a period of 24 hours.

Portions of each split spoon soil sample were returned to our laboratory for engineering review and visual classification by a geotechnical engineer. Also, two bulk soil samples were collected from the auger cuttings of borings located in the proposed "cut" and borrow areas of the site. The bulk samples were transported to our laboratory for standard Proctor compaction testing (ASTM D-698). The Standard Proctor Test Data Sheets are contained in the Appendix.

Soil descriptions, SPT results, and other subsurface data are presented on the individual Soil Test Boring Records in the Appendix. When reviewing the data presented, the stratification lines shown on the Soil Test Boring Records represent the approximate boundaries between soil types, and the transitions between soil strata are gradual. Also, variations in subsurface conditions from those encountered may exist intermediate of the boring locations.

In addition to the Boring Location Plan, Soil Test Boring Records, and laboratory test results, the Appendix contains more detailed descriptions of our drilling procedures and other information pertinent to the geotechnical aspects of this report.

SITE AND SUBSURFACE CONDITIONS

SITE LOCATION AND DESCRIPTION

The project site is located north of Hunter Industrial Park (Phase I) on Industrial Drive near Laurens, South Carolina. The site occupies approximately 63 acres and is generally irregular in shape. The site is currently undeveloped, and most of the property is heavily wooded with small to large diameter trees. In addition to the trees, the ground surface is covered by grass and brush. We also observed a few small old brush piles near the property edges, indicating some previous isolated site clearing. A sanitary sewer line is located along the southern property boundary.

The topography of the Phase II tract is characterized by two small knolls in the northern portion of the site and several ravines in the central, southern, and southeastern portions of the site. Drainage swales were observed throughout the site which intersect these ravines. The ground surface of the site generally slopes gradually downward from north to south across the site with an elevation change of approximately 60 feet. Also, the ground surface slopes moderately to steeply downward toward the ravines and drainage features on the site.

AREA GEOLOGY

The project site is located in the Piedmont Physiographic Province of South Carolina. The Piedmont extends in a "narrow" (50 to 75 miles wide) band of metamorphic rocks from Alabama to New York. This geologic province can best be described topographically as a plain which has eroded into broad rolling hills and valleys. The region is composed of the oldest geologic formations in the southeastern United States. The bedrocks of this area are primarily metamorphic gneisses and schists, with some local granite intrusions. The bedrocks have weathered in-place to form the overburden soils. Because they have weathered from the parent rock, these soils are termed "residuum". The upper soils are most highly weathered and are often composed of silty clays or clayey silts. With depth, these upper materials transition into less cohesive silty sands and sandy silts with varying mica content.

Due to extremely erratic weathering processes, the overburden soils can directly overlay the parent rock or can be separated by a transitional zone of very high consistency material locally termed "partially weathered rock". The partially weathered rock retains much of the appearance of the parent rock and is characterized by standard penetration resistances in excess of 100 blows per foot (bpf). Weathering processes, which are dependent on fractures in the rock, changing groundwater levels, rock mineralogy, and other factors, result in an extremely variable surface of the bedrock. Also, hard rock layers and boulders are often encountered within the overburden soil or partially weathered rock matrix.

Alluvial soils are also likely present in the bottoms of the ravines. Soils which have been eroded, transported, and deposited in areas of water courses are termed "alluvium". Alluvial soils range from clays to gravels, depending upon conditions under which they were deposited. Geologically, alluvium is a recent deposit and is frequently found in a soft or loose condition.

SUBSURFACE CONDITIONS

The soil test borings (B-1 through B-10) encountered between 8 and 10 inches of organic topsoil at the ground surface, although the topsoil is most likely thicker in the more heavily wooded areas of the site. Residual soil (material that has weathered in-place from the parent bedrock) was encountered beneath the topsoil. The residual soils typically consisted of silty sands and sandy silts with varying mica content. Standard penetration resistances obtained in the residual soil zone ranged from 4 to 69 blows per foot (bpf).

The borings performed in the southern building area (borings B-4 through B-6) encountered partially weathered rock (very high consistency material with penetration resistances exceeding 100 bpf) or auger refusal (likely indicating mass rock) shallower than the predetermined boring termination depths. Boring B-4 encountered partially weathered rock (PWR) at a depth of 18 feet (elevation 665 feet) and auger refusal at a depth of 20 feet (elevation 663 feet). Boring B-5 encountered a seam of PWR between depths of 3 to 6 feet (elevation 673 to 670 feet). Boring B-6 encountered auger refusal at a depth of 11 feet (elevation 661 feet). Based on a proposed finished floor elevation of 680 feet, it appears unlikely that extensive excavation difficulty will be encountered during mass grading in this area of the site. The remaining borings were terminated in residual soil at the predetermined boring termination depths of 20 to 30 feet without encountering PWR or auger refusal.

Groundwater was encountered in borings B-1, B-2, and B-8 at depths of 28, 23, and 23 feet (elevations 671, 669, and 660 feet), respectively, at the time of drilling. After a period of 24 hours, the depth to groundwater was measured in these borings at 27, 20, and 20 feet (elevations 672, 672, and 663 feet), respectively. The remaining borings caved at depths ranging from 4 to 22 feet below the ground surface. Caved depths may indicate the potential presence of groundwater. Groundwater levels fluctuate with seasonal and yearly changes in rainfall, and future levels could possibly rise to within the depths drilled. Also, depending on weather conditions, it is likely that groundwater and/or surface water may be encountered during grading in the vicinity of the drainage features.

Two bulk soil samples were collected from the auger cuttings at boring locations in the proposed "cut" and borrow areas of the site. The bulk samples were transported to our laboratory for standard Proctor compaction testing (ASTM D-698).

The first sample was a composite bulk sample taken from the cuttings at borings B-1 (from 0 to 9 feet) and B-4 (from 0 to 3 feet). The results of the standard Proctor compaction test performed on this composite sample indicate that this material has a maximum dry density of 95.0 pounds per cubic foot (pcf) at an optimum moisture content of 26.2 percent. The second sample was collected from the cuttings at boring B-9 (from 0 to 10 feet). This boring was performed in a future development parcel, although it is possible that this parcel may be graded to provide fill soil for the proposed construction. The results of the standard Proctor compaction test performed on this sample indicate that this material has a maximum dry density of 112.5 pcf at an optimum moisture content of 16.3 percent. The test results are included on the Standard Proctor Test Data Sheets contained in the Appendix. Based on the test results and our visual assessments, the soil from these probable cut zones appears satisfactory for use as structural fill.

The above discussion is a relatively brief general description of the subsurface conditions encountered by widely spaced soil test borings. Detailed descriptions of the conditions encountered at each soil test boring location are presented on the individual Soil Test Boring Records contained in the Appendix. When reviewing these Records, the indicated boundaries between soil strata are approximate, and the transitions between soil strata are generally gradual. Also, variations in subsurface conditions from those encountered may exist intermediate of the boring locations.

CONCLUSIONS AND RECOMMENDATIONS

The boring and laboratory results indicate that the soils at the site are generally satisfactory for structural support of the light industrial buildings and can be used as structural fill. However, the natural soil conditions in this area can vary greatly over short horizontal and vertical distances.

Partially weathered rock was encountered in borings B-4 and B-5 at depths of approximately 18 and 3 feet (elevations approximately 665 and 673 feet), respectively. Auger refusal (likely indicating mass rock) was encountered in borings B-4 and B-6 at approximate depths of 20 and 11 feet (elevations approximately 663 to 661 feet), respectively. These borings were performed in areas of the site which will most likely receive structural fill, or require relatively shallow cuts (excavations), during site grading. However; difficult excavation may be encountered during construction of deep utility trenches, and in areas that have not been explored. Although partially weathered rock can typically be excavated with large tracked grading equipment (equipped with rippers), blasting or pneumatic tools may be required to remove the underlying mass rock. We recommend that the grading contract contain provisions for rock excavation. We have included a suggested rock definition in the Appendix for your review.

The remaining borings did not encounter partially weathered rock or auger refusal. These preliminary data indicate that extensive difficult excavation will probably not be encountered in those areas of the site. However, the relatively few borings of this preliminary subsurface exploration were widely spaced, and the bedrock surface can be highly irregular in this area. Thus, it is possible that difficult excavation may be encountered in unexplored areas of the site or in excavations below the depths of the borings. A supplemental geotechnical exploration should be performed after the plans have been finalized to further evaluate potential difficult excavation conditions at the site. The additional borings should extend below expected excavation depths.

Groundwater was encountered in borings B-1, B-2, and B-8 at depths of between 23 and 28 feet (elevations between 671 and 660 feet) at the time of drilling. After a period of 24 hours, groundwater was measured in these borings at depths of between 20 and 27 feet (elevations between 672 and 663 feet). Based on a proposed finished floor elevation of 690.25 feet for the northern building (in the vicinity of borings B-1 and B-2), and a proposed final grade of 686 feet in the vicinity of boring B-8, it appears unlikely that groundwater will significantly influence construction of these facilities. However, depending on weather conditions, it is possible that groundwater and/or surface water may be encountered during grading in the vicinity of the drainage features. Underdrains (French drains) may be required to provide drainage during and following construction. Furthermore, undercutting of loose, wet soils and stone stabilization should be expected prior to placing compacted fill in the drainage features.

The on-site residual soils and partially weathered rock appear adaptable for use as structural fill. Drying or wetting of these materials may be necessary to achieve proper compaction. Structural fill should be free of organics and deleterious material, and have a maximum particle size generally limited to approximately four inches. Some larger rock fragments from on-site sources, if encountered, may be used 3 feet below finished grades in parking areas as long as they do not hinder proper compaction of the surrounding fill soil.

Placement of up to 25 feet of fill in the drainage features will induce several inches of settlement in these areas of the site. Building construction over the deep fill should not begin until most of the fill induced settlement has occurred. Field monitoring of the settlement will be required to determine when most of the settlement has occurred. We suggest that laboratory testing (consolidation tests) be performed during the supplemental geotechnical exploration to estimate the magnitude and rate of settlement.

Based on the exploration results, expected loads, and our experience with similar soil conditions, we anticipate that shallow spread footing foundations can be used to support the proposed light industrial buildings. These foundations may bear in residual soil or new structural fill. Depending on the final footing elevations and loads, allowable bearing pressures of between 3000 and 4000 pounds per square foot (psf) appear reasonable for the residual soils. Footings that bear in structural fill should be designed for a maximum allowable bearing pressure of 3000 psf. Floor slabs may also be conventionally supported by residual soil or structural fill.

When design of the industrial park facilities is more advanced (final building and pavement locations and grades selected) and structural loads are known, a design phase geotechnical exploration should be performed. This exploration should include additional soil test borings (performed within the building locations and proposed pavement areas) and laboratory testing as deemed necessary. The design phase geotechnical report will offer specific recommendations regarding foundation and retaining wall design, earthwork procedures, and other geotechnical issues identified, such as the potential settlement induced by the deep fill. This report will also consider additional information, such as structural loads, pavement performance criteria, or any areas of extraordinary floor slab criteria.

LIMITATIONS

This report has been prepared for the exclusive use of the Laurens Commission of Public Works, Wiedeman and Singleton, Inc., and their designers for specific application to the project described herein. The preliminary subsurface exploration was performed in accordance with generally accepted standards of geotechnical engineering practice in the State of South Carolina at the time of this report. No other warranty is expressed or implied. QORE, Inc. is not responsible for the conclusions, opinions, or recommendations of others based on these data.

The above conclusions and recommendations are based on the project information provided to us, the boring results, and our experience with similar site and subsurface conditions. They do not reflect variations in subsurface conditions from those encountered by the borings. Further, the conclusions should be considered preliminary. Once a site layout and grading plan have been finalized, we should be contacted to review our recommendations. Additional borings, laboratory testing, and final geotechnical evaluations will be needed to complete the design process.

ACKNOWLEDGEMENT

QORE, Inc. appreciates the opportunity to be of service to you by performing this preliminary geotechnical exploration, and we look forward to continuing to serve you on this project during the final design and construction phases. We are available to answer any questions that may arise from this report. If we can be of any additional assistance, please contact us at your convenience.

Respectfully submitted,

QORE, Inc.
SC COA #C00356

Gant M. Taylor, E.I.T.
Staff Engineer

7/15/99

Kenneth W. Weinel, P.E.
Registered Engineer
SC Registration #15921

C. Scott Fletcher, P.E.
Chief Geotechnical Engineer
SC Registration #9331

GMT/kk

APPENDIX

Boring Location Plan

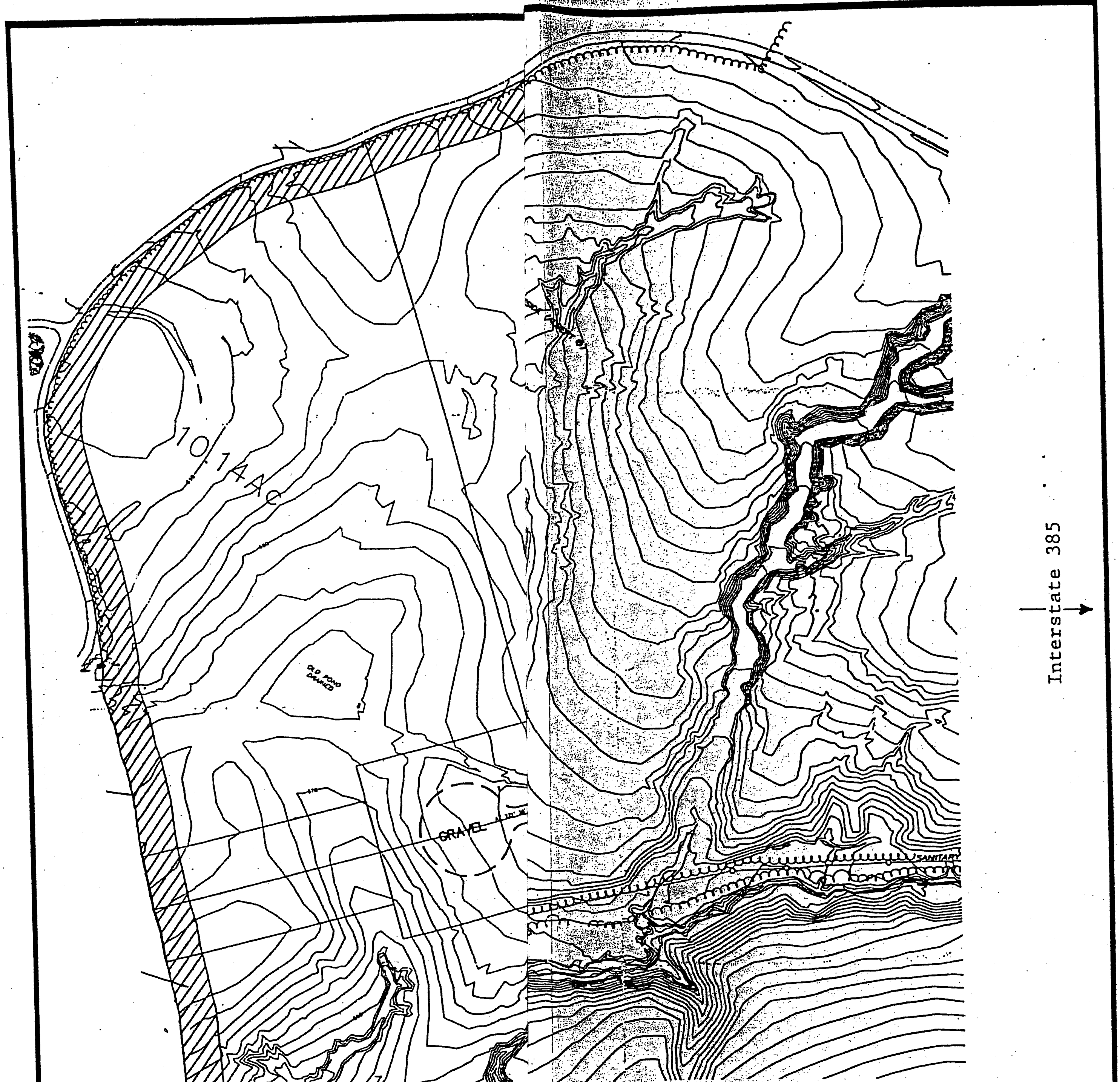
Soil Test Boring Records

Standard Proctor Test Data Sheets

Boring Procedures

Rock Definition

ASFE Information Sheet



er Industrial Park
Phase I

Reference: "Grading Plan" provided by Wiedeman and Singleton Engineers (Dated May 1999).

PLATE 1	JOB NUMBER 5519	SCALE 1"=200'±
	REPORT NO. 73701	DATE 6-28-99
	DRAWN BY GMT	CHECKED BY KWW

Boring No. B-1

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/01/99
DRILL METHOD: HSA

SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: 28 ft.
WL 24 HRS.: 27 ft.
GROUND ELEV.: 699 +/- ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	BLOWS/FT.	REMARKS
8 Inches Topsoil			0			
Residuum - Stiff Brownish Red and Yellowish Brown Sandy Silt	ML		1		13	
			2			
			3			
Firm Light Brown and Yellow Silty Fine Sand	SM		4			
			5		10	
			6			
			7			
			8			
			9			
			10		16	
			11			
			12			
			13			
			14			
Soft to Firm Light Brown, Light Grayish Yellow, and Black Sandy Silt	ML		15		12	
			16			
			17			
			18			
			19			
			20		4	
			21			
			22			
			23			
			24			
Firm Light Brown Silty Fine to Medium Sand	SM		25		7	
			26			
			27			
			28			
			29			
			30		11	

Notes:

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Southeast Region

Project No.
5519

Boring No. B-2

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA

SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: 23 ft.
WL 24 HRS.: 20 ft.
GROUND ELEV.: 692 +/- ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	BLOWS/FT.	REMARKS
8 Inches Topsoil Residuum - Firm Brown, Light Brown, and Grayish Yellow Silty Fine Sand	SM		0–8	1–2.5, 3.5–5	11, 11	
Firm Light Brown, Yellow, and Gray Sandy Silt	ML		8–15	8.5–10, 13.5–15	6, 7	
Loose Brown, Yellowish Gray, and Brownish Yellow Silty Fine Sand	SM	▼ (20)	15–25	18.5–20, 23.5–25	6, 7	
Boring Terminated			25			

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Consultants in the earth sciences
Southeast Region

Notes:

Project No. 5519

Boring No. B-3

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/01/99
DRILL METHOD: HSA

SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: Did Not Encounter
WL 24 HRS.: Caved at 21 ft.
GROUND ELEV.: 691 +/- ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	BLOWS/FT.	REMARKS
10 Inches Topsoil	SM		0			
Residuum - Reddish Brown, Brownish Yellow, and Brown Silty Fine to Medium Sand			1–3	◩	12	
			4–5	◩	14	
Firm Brown, Yellow, and Black Silty Fine Sand	SM		5–8			
			9–10	◩	11	
			14–15	◩	13	
Firm Brown, Light Brown, and Dark Gray Silty Fine to Coarse Sand	SM		18			
			19–20	◩	13	
			24–25	◩	16	
Boring Terminated			25–30			

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Southeast Region

Notes:

Project No.
5519

Boring No. B-4

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA

SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: Did Not Encounter
WL 24 HRS.: Caved at 11 ft.
GROUND ELEV.: 683 +/- ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	BLOWS/FT.	REMARKS
10 Inches Topsoil			0			
Residuum - Very Dense Brown and Light Brown Silty Fine to Medium Sand	SM		1–3	Split spoon (1–2.5 ft)	51	
Very Dense Brown, Dark Gray, and White Silty Fine to Coarse Sand	SM		3–18	Split spoon (3.5–5, 8.5–10, 13.5–15 ft)	56, 63, 69	
Partially Weathered Rock - No Recovery	PWR		18–20	Split spoon (18.5–20 ft)	50/4"	
Auger Refusal Encountered at 20 Feet - Boring Terminated			20			

Depth scale: 0–30 ft.

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Southeast Region

Notes:

Project No. 5519

Boring No. B-5

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA

SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: Did Not Encounter
WL 24 HRS.: Caved at 12 ft.
GROUND ELEV.: 676 +/- ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	BLOWS/FT.	REMARKS
8 Inches Topsoil Residuum - Very Firm Light Brown Silty Fine to Medium Sand	SM		0 – 3	Split Spoon	21	
Partially Weathered Rock - Sampled as Very Dense White and Light Red Silty Fine to Coarse Sand with Gravel	PWR		3 – 6	Split Spoon	50/3"	
Residuum - Dense Brown and Very Light Gray Silty Fine to Medium Sand	SM		6 – 18	Split Spoon	46	
				Split Spoon	34	
Dense Brown, Light Brown, and Black Silty Fine to Coarse Sand with Gravel	SM		18 – 25	Split Spoon	41	
				Split Spoon	41	
Boring Terminated at 25 Feet			25			

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Southeast Region

Notes:

Project No.
5519

Boring No. B-6

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA

SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: Did Not Encounter
WL 24 HRS.: Caved at 4 ft.
GROUND ELEV.: 672 +/- ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	BLOWS/FT.	REMARKS
8 Inches Topsoil			0			
Residuum - Very Firm Yellowish Brown and Gray Silty Fine to Coarse Sand with Gravel	SM		1–3	Split spoon (1–2.5)	24	
Stiff Light Brown Sandy Silt	ML		3–7	Split spoon (3.5–5)	14	
Very Firm Light Grayish Brown Silty Fine to Medium Sand	SM		7–11	Split spoon (8.5–10)	28	
Auger Refusal Encountered at 11 Feet - Boring Terminated			11			

Depth scale: 0–30 ft.

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Southeast Region

Notes:

Project No.
5519

Boring No. B-7

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA
SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: Did Not Encounter
WL 24 HRS.: Caved at 12 ft.
GROUND ELEV.: 679 +/- ft. MSL

DESCRIPTION	USCS CLASS	GRAPHIC LOG	DEPTH	SAMPLE	BLOWS/FT.	REMARKS
9 Inches Topsoil			0			
Residuum - Loose to Very Loose Light Reddish Brown, Light Brown, and Brownish Yellow Silty Fine Sand	SM		1–2	◪	8	
			4–5	◪	7	
			9–10	◪	4	
			14–15	◪	4	
Firm Light Yellowish Brown and Black Slightly Micaceous Sandy Silt	ML		15			
			19–20	◪	8	
Boring Terminated			20			

Depth scale: 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

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Consultants in the earth sciences
Southeast Region

Notes:

Project No.
5519

Boring No. B-8

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA

SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: 23 ft.
WL 24 HRS.: 20 ft.
GROUND ELEV.: 683 +/- ft. MSL

DESCRIPTION	USCS CLASS	DEPTH	BLOWS/FT.	REMARKS
10 Inches Topsoil Residuum – Firm Reddish Brown and Yellowish Brown Silty Fine to Medium Sand	SM	0–8	16 15	
Firm Brownish Red and Yellowish Gray Silty Fine Sand	SM	8–12	15	
Very Firm Light Red, Light Brown, and White Slightly Micaceous Silty Fine to Coarse Sand	SM	12–17	24	
Firm Light Yellowish Brown, Yellowish Gray, and Black Sandy Silt	ML	17–25	7 6	
Boring Terminated		25		

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Consultants in the earth sciences
Southeast Region

Notes:

Project No. 5519

Boring No. B-9

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA
SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: Did Not Encounter
WL 24 HRS.: Caved at 14 ft.
GROUND ELEV.: 699 +/- ft. MSL

DESCRIPTION	USCS CLASS	DEPTH (ft)	SAMPLE	BLOWS/FT.	REMARKS
8 Inches Topsoil		0			
Residuum - Very Firm Reddish Brown and Yellowish Brown Slightly Micaceous to Micaceous Silty Fine to Medium Sand	SM	0–8	1–2.5	29	
			3.5–5	25	
Firm Light Brown and Brownish Yellow Slightly Micaceous Silty Fine Sand	SM	8–18	8.5–10	13	
			13.5–15	18	
Firm Brown and White Silty Fine to Medium Sand	SM	18–21	18.5–20	18	
Very Firm Brown and Gray Micaceous Silty Fine to Medium Sand	SM	21–25	23.5–25	24	
Boring Terminated		25			

Notes:

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Southeast Region

Project No. 5519

Boring No. B-10

PROJECT: Hunter Industrial Park Phase II
REPORT NO.: 73701
DATE DRILLED: 07/02/99
DRILL METHOD: HSA
SAMPLE METHOD: Split Spoon
WATER LEVEL TOB: Did Not Encounter
WL 24 HRS.: Caved at 22 ft.
GROUND ELEV.: 686 +/- ft. MSL

DESCRIPTION	USCS CLASS	DEPTH	REMARKS
10 Inches Topsoil		0	
Residuum - Stiff Dark Brownish Red and Brownish Yellow Sandy Silt with Traces of Roots	ML	0 – 7	
Loose Reddish Brown and Brownish Yellow Slightly Micaceous Silty Fine to Medium Sand	SM	7 – 17	
Loose Dark Brownish Red, Yellow, and Black Slightly Micaceous Silty Fine Sand	SM	17 – 25	
Boring Terminated		25	

SAMPLE (DEPTH)	BLOWS/FT.
1 – 2.5	14
3.5 – 5	13
8.5 – 10	8
13.5 – 15	7
18.5 – 20	8
23.5 – 25	7

Depth scale: 0 – 30

QORE™
ROPERTY SCIENCES

MOISTURE-DENSITY RELATIONSHIPS OF SOILS

DATE: 7-6-99

CLIENT: Wiedeman and Singleton, Inc.

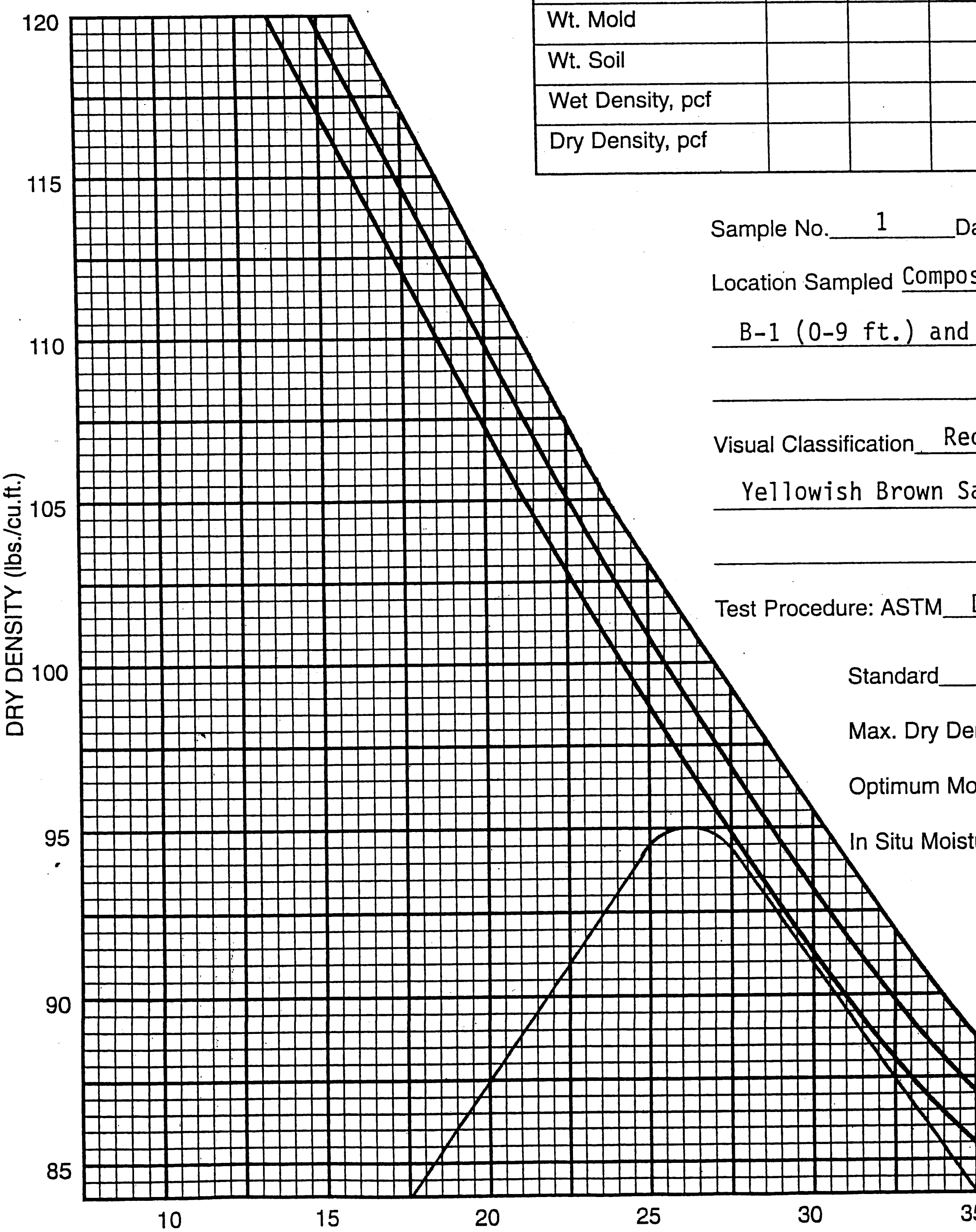
PROJECT: Hunter Industrial Park Phase II

JOB NO.: 5519

REPORT NO.: 73701

TESTED BY: NG

Water Added, cc						
Wt. Wet Soil						
Wt. Dry Soil						
Wt. Water						
Moisture Content, %						
Wt. Soil & Mold						
Wt. Mold						
Wt. Soil						
Wet Density, pcf						
Dry Density, pcf						



Sample No. 1 Date Sampled 7-1-99

Location Sampled Composite Bulk Sample: B-1 (0-9 ft.) and B-4 (0-3 ft.)

Sampled By GMT

Visual Classification Reddish Brown and Yellowish Brown Sandy Silt

Test Procedure: ASTM D-698 Method A

Standard X Modified

Max. Dry Density 95.0 pcf

Optimum Moisture 26.2 %

In Situ Moisture %

ZERO AIR VOIDS CURVES

SPECIFIC GRAVITY

2.80

2.70

2.60

QORE™
PROPERTY SCIENCES

MOISTURE-DENSITY RELATIONSHIPS OF SOILS

DATE: 7-6-99

CLIENT: Wiedeman and Singleton, Inc.

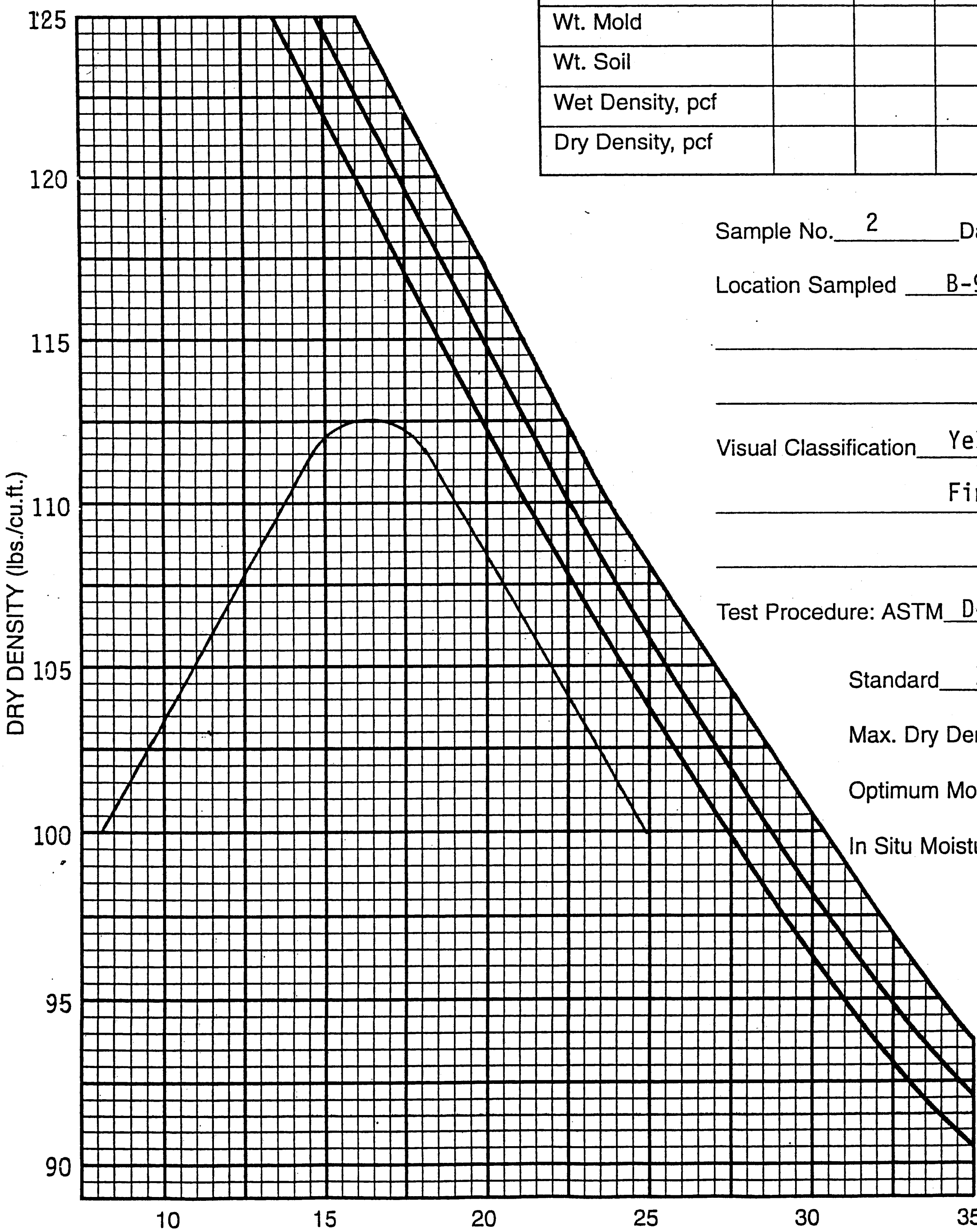
PROJECT: Hunter Industrial Park Phase II

JOB NO.: 5519

REPORT NO.: 73701

TESTED BY: NG

Water Added, cc						
Wt. Wet Soil						
Wt. Dry Soil						
Wt. Water						
Moisture Content, %						
Wt. Soil & Mold						
Wt. Mold						
Wt. Soil						
Wet Density, pcf						
Dry Density, pcf						



Sample No. 2 Date Sampled 7-2-99

Location Sampled B-9 (0-10 ft.)

Sampled By GMT

Visual Classification Yellowish Brown Silty Fine Sand

Test Procedure: ASTM D-698 Method A

Standard X Modified

Max. Dry Density 112.5 pcf

Optimum Moisture 16.3 %

In Situ Moisture %

SOIL TEST BORING, ASTM D-1586

The borings were made with a hollow-stem auger powered by a 125-horsepower drill rig. At regular intervals, soil samples were obtained through the hollow augers with a standard 1.4-inch I.D., 2.0-inch O.D. split-tube sampler.

The sampler was initially seated 6 inches to penetrate any loose cuttings; then driven an additional foot with blows of a 140-pound hammer falling 30 inches. The number of hammer blows required to drive the sampler the final foot was recorded and is designated as the *standard penetration resistance*. Penetration resistance, when properly evaluated, is an index to soil strength and density.

In the field, the driller logged and described the samples as they were obtained. Representative portions of each soil sample were then sealed in labeled glass jars and transported to our laboratory. The samples were examined by a graduate geotechnical engineer or engineering geologist to visually check the field descriptions. Boring data, including sample intervals, penetration resistances, soil descriptions, and groundwater level are shown on the attached Test Boring Records.

ROCK DEFINITION

We suggest that *Rock* be defined as the following:

General Excavation:

Any material which cannot be excavated with a single-tooth ripper drawn by a crawler tractor having a draw bar pull rated at not less than 56,000 pounds (Caterpillar D8K or equivalent) or excavated by a front-end loader with a minimum bucket breakout force of 25,600 pounds (Caterpillar 977 or equivalent).

Trench Excavation:

Any material which cannot be excavated with a backhoe having a bucket curling force rated at not less than 33,000 pounds (Caterpillar 225B or equivalent).

Important Information About Your

Geotechnical Engineering Report

Subsurface problems are a principal cause of construction delays, cost overruns, claims, and disputes.

The following information is provided to help you manage your risks.

Geotechnical Services Are Performed for Specific Purposes, Persons, and Projects

Geotechnical engineers structure their services to meet the specific needs of their clients. A geotechnical engineering study conducted for a civil engineer may not fulfill the needs of a construction contractor or even another civil engineer. Because each geotechnical engineering study is unique, each geotechnical engineering report is unique, prepared *solely* for the client. *No one except you* should rely on your geotechnical engineering report without first conferring with the geotechnical engineer who prepared it. *And no one—not even you*—should apply the report for any purpose or project except the one originally contemplated.

A Geotechnical Engineering Report Is Based on A Unique Set of Project-Specific Factors

Geotechnical engineers consider a number of unique, project-specific factors when establishing the scope of a study. Typical factors include: the client's goals, objectives, and risk management preferences; the general nature of the structure involved, its size, and configuration; the location of the structure on the site; and other planned or existing site improvements, such as access roads, parking lots, and underground utilities. Unless the geotechnical engineer who conducted the study specifically indicates otherwise, *do not rely on a geotechnical engineering report* that was:

- not prepared for you,
- not prepared for your project,
- not prepared for the specific site explored, or
- completed before important project changes were made.

Typical changes that can erode the reliability of an existing geotechnical engineering report include those that affect:

- the function of the proposed structure, as when it's changed from a parking garage to an office building, or from a light industrial plant to a refrigerated warehouse,
- elevation, configuration, location, orientation, or weight of the proposed structure,
- composition of the design team, or
- project ownership.

As a general rule, *always* inform your geotechnical engineer of project changes—even minor ones—and request an assessment of their impact. *Geotechnical engineers cannot accept responsibility or liability for problems that occur because their reports do not consider developments of which they were not informed.*

Subsurface Conditions Can Change

A geotechnical engineering report is based on conditions that existed at the time the study was performed. *Do not rely on a geotechnical engineering report* whose adequacy may have been affected by: the passage of time; by man-made events, such as construction on or adjacent to the site; or by natural events, such as floods, earthquakes, or groundwater fluctuations. *Always* contact the geotechnical engineer before applying the report to determine if it is still reliable. A minor amount of additional testing or analysis could prevent major problems.

Most Geotechnical Findings Are Professional Opinions

Site exploration identifies subsurface conditions *only* at those points where subsurface tests are conducted or samples are taken. Geotechnical engineers review field and laboratory data and then apply their professional judgment to render an *opinion* about subsurface conditions throughout the site. Actual subsurface conditions may differ—sometimes significantly—from those indicated in your report. Retaining the geotechnical engineer who developed your report to provide construction observation is the most effective method of managing the risks associated with unanticipated conditions.

A Report's Recommendations Are *Not* Final

Do not overrely on the construction recommendations included in your report. *Those recommendations are not final,* because geotechnical engineers develop them principally from judgment and opinion. Geotechnical engineers can finalize their recommendations only by observing actual subsurface conditions revealed during construction. *The geotechnical engineer who developed your report cannot assume responsibility or liability for the report's recommendations if that engineer does not perform construction observation.*

A Geotechnical Engineering Report Is Subject To Misinterpretation

Other design team members' misinterpretation of geotechnical engineering reports has resulted in costly problems. Lower that risk by having your geotechnical engineer confer with appropriate members of the design team after submitting the report. Also retain your geotechnical engineer to review pertinent elements of the design team's plans and specifications. Contractors can also misinterpret a geotechnical engineering report. Reduce that risk by having your geotechnical engineer participate in prebid and preconstruction conferences, and by providing construction observation.

Do Not Redraw the Engineer's Logs

Geotechnical engineers prepare final boring and testing logs based upon their interpretation of field logs and laboratory data. To prevent errors or omissions, the logs included in a geotechnical engineering report should *never* be redrawn for inclusion in architectural or other design drawings. Only photographic or electronic reproduction is acceptable, *but recognize that separating logs from the report can elevate risk.*

Give Contractors a Complete Report and Guidance

Some owners and design professionals mistakenly believe they can make contractors liable for unanticipated subsurface conditions by limiting what they provide for bid preparation. To help prevent costly problems, give contractors the complete geotechnical engineering report, *but* preface it with a clearly written letter of transmittal. In that letter, advise contractors that the report was not prepared for purposes of bid development and that the report's accuracy is limited; encourage them to confer with the geotechnical engineer who prepared the report (a modest fee may be required) and/or to conduct additional study to obtain the specific types of information they need or prefer. A prebid conference can also be valuable. *Be sure contractors have sufficient time* to perform additional study. Only then might you be in a position to give contractors the best information available to you, while requiring them to at least share some of the financial responsibilities stemming from unanticipated conditions.

Read Responsibility Provisions Closely

Some clients, design professionals, and contractors do not recognize that geotechnical engineering is far less exact than other engineering disciplines. This lack of understanding has created unrealistic expectations that have led to disappointments, claims, and disputes. To help reduce such risks, geotechnical engineers commonly include a variety of explanatory provisions in their reports. Sometimes labeled "limitations", many of these provisions indicate where geotechnical engineers responsibilities begin and end, to help others recognize their own responsibilities and risks. *Read these provisions closely.* Ask questions. Your geotechnical engineer should respond fully and frankly.

Geoenvironmental Concerns Are Not Covered

The equipment, techniques, and personnel used to perform a *geoenvironmental* study differ significantly from those used to perform a *geotechnical* study. For that reason, a geotechnical engineering report does not usually relate any geoenvironmental findings, conclusions, or recommendations; e.g., about the likelihood of encountering underground storage tanks or regulated contaminants. *Unanticipated environmental problems have led to numerous project failures.* If you have not yet obtained your own geoenvironmental information, ask your geotechnical consultant for risk management guidance. *Do not rely on an environmental report prepared for someone else.*

Rely on Your Geotechnical Engineer for Additional Assistance

Membership in ASFE exposes geotechnical engineers to a wide array of risk management techniques that can be of genuine benefit for everyone involved with a construction project. Confer with your ASFE-member geotechnical engineer for more information.

ASFE PROFESSIONAL FIRMS PRACTICING IN THE GEOSCIENCES

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email: info@asfe.org www.asfe.org

IIGER06983.5M

atlanta testing
& engineering

REPORT

OF

SUBSURFACE EXPLORATION

HUNTER INDUSTRIAL PARK ACCESS ROAD
LAURENS COUNTY, SOUTH CAROLINA
AT&E JOB NO. G-2686, REPORT NO. G-37614